Learning design studio: educational practice as design inquiry of learning

Book Section

Learning Design Studio: Educational Practice as Design Inquiry of Learning

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Abstract. Recently we are urged to transform education into an evidence based profession, and promote scientific standards or practice. These calls are not new – they seem to emerge every few years. We do not argue with their goal, but we contend that the suitable frame of reference is the paradigm of design science, rather than the common metaphor of medical research. This paper proposes Design Inquiry of Learning as a projection of educational design science into a professional domain, and offers the Learning Design Studio as a pedagogical manifestation of this approach. The learning design studio is a collaborative, blended, project based framework for training educators in effective and evidence-based use of educational technology. We present its theoretical underpinnings, note its fundamental principles and structures, and review three independent cases where it has been trialed. The results show that this model is effective in developing learners' theoretical knowledge as well as their practical skills, and allows them to link the two. However, it requires a considerable commitment of both learners and tutors, and may not be applicable in more casual settings.

Keywords: Learning design, teacher training, professional development, inquiry based learning, learning design studio.

1 Introduction

Recently we are urged to transform education into an evidence based profession, and promote scientific standards or practice. In fact, such calls seem to resurface every few years. The cause itself is laudable: if we wish to provide learners with effective opportunities to gain the knowledge, skills, and attitudes that they seek (or that we wish to bestow on them), and we want to do this in an efficient use of resources – we need to apply scientific rigor to our practice. The problem we see with such calls is twofold: first, they often place the onus on teachers, who are requested to adopt a more "scientific" or "research based" stance. Yet teachers typically find scientific research hard to apply in their non-research daily settings. The other, perhaps more fundamental flaw, is the implicit model of scientific knowledge and the modes of its production. While medical research is often cited as the metaphor for a desirable

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transformation of educational practice, we argue that the paradigm of design science is a more suitable frame of reference.

In order to instill scientific rigor as a mode of practice, we need to raise practitioners awareness to the necessity of such rigor, and equip them with the tools to support it. In other words, we need to guide practitioners in adopting and developing appropriate epistemic practices: the practices by which they establish knowledge within their domain. What are the appropriate domain-specific epistemic practices for the practical application of technology in education? Teachers operate in a complex and dynamic domain – the background knowledge and practices of their students constantly change, the technologies and resources at their disposal are perpetually evolving, and the guidance and directives they receive are frequently updated. Within this domain, they need to habitually devise new means for achieving educational goals – engendering change in their students' knowledge, behaviors, or attitudes. We posit that this is fundamentally a task of learning design, and the appropriate epistemic practice is one of design inquiry of learning. This paper presents the "Learning Design Studio", a course format aimed at enculturation educational professionals into design inquiry of learning. We note three courses and a MOOC which were based on this format, review some results, and consider their implications.

2 Background

Ben Goldacre, in a recent position paper commissioned by the UK department of education [8], called for making "teaching a truly evidence-based profession" by establishing a norm of randomized control trials. This call was answered by vocal objections in the educational research community. As Mary James notes [12], such arguments are not new. David Hargreaves [11] promoted "teaching as a research-based profession" in 1996, a position echoed by Philip Davies [8], among others. Yet, as Davies notes – the fault is not with teachers. Academic research, he argues (in agreement with Hargreaves), is often not relevant or not accessible to practitioners. Mellar, Oliver and Hadjithoma-Garstka [18] find that research is perceived by practitioners as providing too much detail, or conflicting evidence, does not address their immediate concerns or does not acknowledge the reality of their experiences. Ironically, they conclude, "the same characteristics that make it hard to draw general principles from the work can also make it credible to practitioners". Korthagen et al [15] show that teacher training which focuses on educational theory fails consistently. Not only do teachers find themselves ill-equipped to translate the theoretical abstractions to the concrete context in which they work, their negative experience in attempting to do so results in theory aversion: teachers feel threatened by educational theory and see teacher education as detached and useless.

This sense of dissonance between educational research and practice often leads practitioners and policy makers to disengage with research, seeing teaching as "a craft and it is best learnt as an apprentice observing a master craftsman or -woman." [9, in 3]. Yet, as [23] show, the most successful educational systems are those maintain multi-directional links between research, practice and teacher training.

We hold that the weakness in the position of Goldacre and others before him is not in the aspiration for scientific rigor, but in the scientific frame of reference. While both Goldacre and Hargreaves draw their examples from positivist research in medicine, Diana Laurillard [16] argues that teaching should be repositioned as a design science. Laurillard adopts Simon's [26] paradigmatic distinction between natural science which describes how the world is, and design science which is concerned with how it should be. Design science is value laden, functionally oriented and representation sensitive [22]. Design, in this context, is the informed creative practice of devising "*courses of action aimed at changing existing situations into desired ones*" [26, p 129]. In identifying certain situations as more desirable than others, design science starts off from a value proposition. It seeks to promote change, rather than describe the current state of affairs, and is thus focused on function rather than structure. Finally, since it deals with human action and perception – the manner in which ideas are (re)presented is important, not just their validity.

One potent emerging approach to linking research and practice is *Teacher Inquiry into Student Learning (TISL)* [5]. Following an action research tradition, the TISL approach addresses the professional development of teachers by investigating student learning through action-oriented, evidence-based inquiry.

Another emerging approach addresses teachers' professional development by positioning them as learning designers and focusing on the practical process of devising effective learning experiences [13]. Recent studies demonstrate how training teachers as learning designers enhances not only their practical skills but also their theoretical understanding [4], [16], [25], [26].

We propose a synergy of these approaches: projecting the idea of teacher inquiry onto the paradigm of design science leads us to a model of teaching a *Design Inquiry of Learning (DIL)*. Inquiry-based learning attempts to shape educational experiences in the model of scientific investigation. Similarly, an inquiry approach to the training of educational practitioners should mimic the form of design research in education.

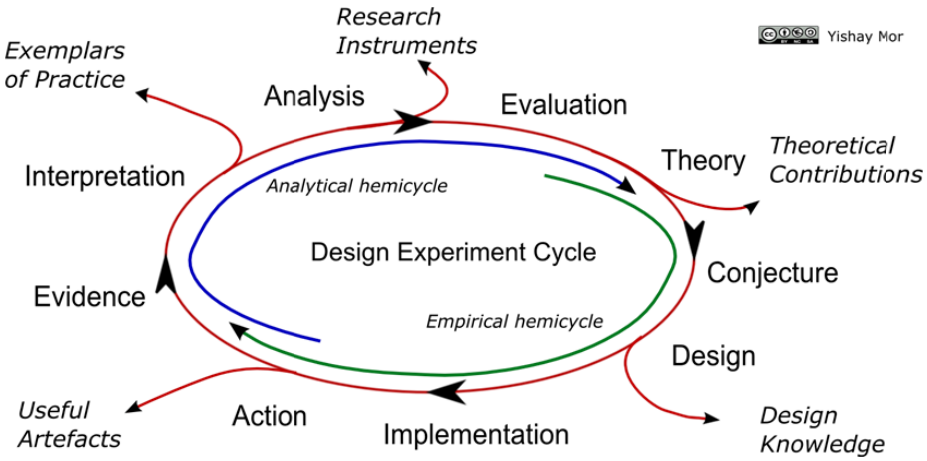

Fig. 1. The Design Research Cycle

Thus, the DIL approach mimics the structure of an educational design study [22], with the exception that students do not have the resources or the time to conduct several iterations, scaling up from a conceptual prototype to an extensive deployment.

Design based research progresses through cycles of theoretical analysis, conjectures, design, implementation, analysis and evaluation – which feeds into adjusting the theory and deriving practical artefacts (Fig. 1) [18]. Anastopoulou et al [1] describe personal inquiry learning as a cycle of questioning, investigation, evidence collection, analysis, sharing, and reflection. Combining these two yields the cycle of design inquiry of learning: imagining a desired change, investigating the current situation, drawing inspiration from theoretical frameworks and exemplars of practice, ideating and designing an innovation, prototyping it, evaluating its effects and reflecting on the process.

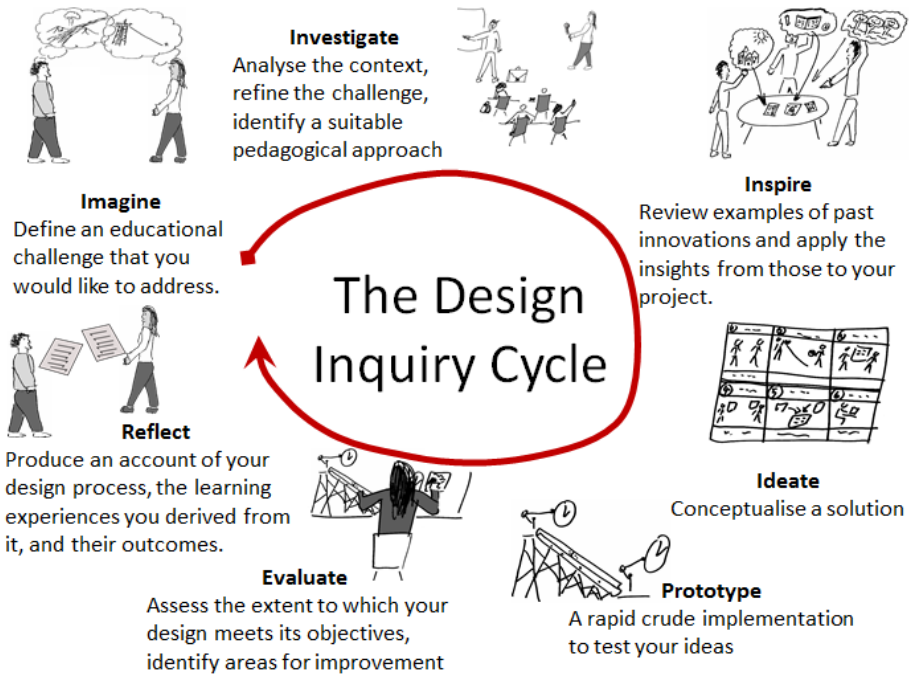

Fig. 2. The Design Inquiry of Learning Cycle

3 The Learning Design Studio

One approach which appears to hold significant promise in training learning designers is the learning design studio (LDS) [13], [4]. This approach is modelled after the tradition of studio-instruction in arts and design disciplines (such as architecture). In this model, the main activity of a course is the students' continued work on design challenges in a defined domain of practice. Students typically work in groups. They identify an educational challenge, research it, and devise innovative means of

addressing it. The course instructor guides the students through the process, and classroom sessions are mostly dedicated to group work and public review of design artefacts.

The model of learning design studio presented in this paper manifests the DIL approach presented above.

In a LDS, students work in groups on projects of their own choice. Each group identifies a concrete educational context and a specific educational challenge within this context, locates and reviews relevant literature, devise a techno-pedagogical innovation to address the chosen challenge in its context, and evaluate their innovation – if possible, by observing its implementation in the real-world context.

The first phase of an LDS course focuses on defining the context in which projects will be situated and the pedagogical challenge they attempt to address within this context. Students are asked to propose an idea for a project they would like to develop. They form groups based on common interests, and spend the majority of the course time working on their joint project. Students document and described the material, social and intentional factors which define the environment in which they will work. Reflecting on the tensions identified in the analysis of the context, students are asked to specify well-defined and measurable educational objectives. Next, they conduct preliminary research, reviewing appropriate learning theories and relevant case studies, and choosing the theories which they identify with and the cases which inspire them, as a basis for their design work.

Based on their articulation of the context and challenge, and the outcomes of their preliminary research, students develop an initial scenario, which included an outline of the proposed solution, and a storyboard depicting the learner's envisioned activities and expected learning trajectory. Students consult existing repositories of design knowledge, such as the design principles database [14] or appropriate collections of design patterns [18], [22]. They articulate the knowledge they gathered in the form of a prototype of their solution. This prototype is evaluated, if possible – through a pilot study in the actual project settings, and if not – via a heuristic evaluation by peers or experts.

Despite the seemingly pragmatic, action-oriented nature of the LDS, individual and group reflection are central to the learning experience. Students are instructed to maintain a learning journal, provide peer feedback within and between project groups, and conclude the process by writing a design narrative, recounting their journey.

Students use a website as a collaborative workspace which scaffolds them through the LDS process. When they complete their project, they edit their website to present their work - the design process, its outputs, and their reflections.

4 Implementation

The learning design studio format was trialled in two courses at the Technologies in Education postgraduate programme at the University of Haifa during the academic year 2010-2011, in the Open Learning Design Massive Open Online Course (OLDS

MOOC) and in one course in The Open University's Master in Open and Distance education programme.

The University of Haifa cases were a course on "games and learning" (http://courses.edtech.haifa.ac.il/games) and a course on "mobile learning" (http://courses.edtech.haifa.ac.il/mlearning) [21]. Both ran for 13 weeks in a blended format (2 hours face time, 4 hours independent study). The first included 22 students, who split into 9 project groups. The second included 17 students in 6 project groups. The courses used the institutional google apps suite as a platform. Students created a project site from a template which was provided, and used it throughout the course. The website template contained sections corresponding to the phases of a single iteration of a design experiment. Students replaced the instructions in the template with the content and artefacts they generated in the course of their work, so that when they completed the project, the website presented both its products and the process by which they were created. All students passed, and all projects were completed.

The OLDS MOOC (http://olds.ac.uk) ran for nine weeks, from Jan. to March 2013. The course was designed for 3-10 hours a week, but many participants could not commit to this timeframe. Out of the 2420 who registered their interest in the course, 200-300 where still following the course in week 8, but only 23 where actively contributing to the course space. The course used a google site and two google groups as its focal space, with "clouds" and "cloudscapes" in cloudworks (http://www.cloudworks.ac.uk) to support specific activities. Some participants used their personal blog as their medium for participation.

The OU case was a 7 week block out of the 30 week MA course "openness and innovation in elearning" (http://www3.open.ac.uk/study/postgraduate/course/h817.htm). This course has 70 students registered. It is taught fully online and students are expected to commit 14 hours a week. The students were assigned to 11 project groups

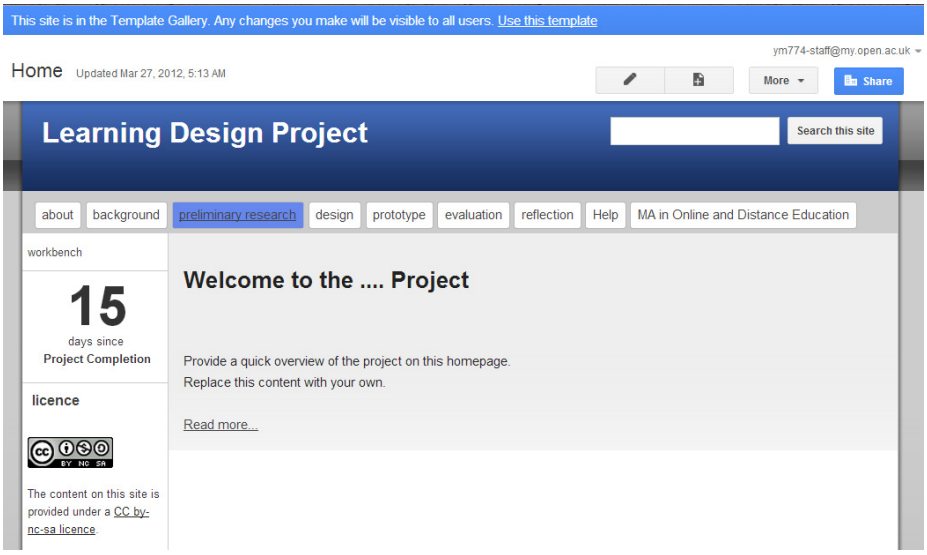

Fig. 3. OU project website template

based on their choice of project subject. The course used the OU version of Moodle as a VLE, and students also used the institutional suite of google apps as their collaborative workspace. Similar to the University of Haifa courses, students were provided with a website template (Fig. 3) which scaffolded their work. This template offered website sections which corresponded to the various phases in the project lifecycle. Students edited and populated this site as they progressed.

In addition, the course used a bespoke system called OpenDesignStudio for sharing and discussing their work between project groups. 10 out of the 11 projects were completed successfully, most with impressive outputs. All projects received a large number of comments from peers in other project groups. This block has ended very recently, and is currently being evaluated. As in the University of Haifa courses, each group maintained a website for their project, instantiated from a template designed to scaffold their design process.

4.1 Variations

The characteristics of the three domains of implementation were radically different, and consequently the design of the LDS, and the supporting technology, had to be adjusted significantly to suit the different situations.

The University of Haifa courses where conducted in a blended environment: weekly classroom sessions with continuous interaction between students and tutor via the course forum, email, and skype. The classroom sessions were dedicated mainly to summarizing the online discussions and reviewing students' progress on their projects. Students often met out of classroom to work on their projects together – either physically or virtually (e.g. by skype). The relatively longer time span of the courses (13 weeks) meant that most students had the opportunity to test their design in real-world conditions, with learners representing the target audience, adding a great deal of depth to their learning experience. The project sites were shared in a "walled garden" during the course – visible only to the course community. After completion, students had the option of making their projects public, and most chose to do so.

The OLDS MOOC assumed a radically open stance: no registration was required, all resources were, and still are, freely and openly available, and facilitators repeatedly noted that peripheral, casual and incidental participation were legitimate. Consequently, participants found it hard to form project teams. The open nature of the course also implied that we did not have the option of setting up a project site template for participants to use. The majority of participants found it hard to form project teams, and did not systematically work through the proposed phases of a learning design project. These limitations, to an extent, were predicted by the course team. In response, the tasks were designed as autonomous building blocks, which can be experienced individually but can also stack up to more complex and rich learning structures. The open nature of the course also meant that participants work was typically public throughout the course and beyond, although it also meant that they had an option of keeping their work completely private. Another significant difference was that the MOOC was facilitated completely online, and the ratio of facilitators to participants was two scales of magnitude higher. This made the classical studio

format irrelevant. To provide an alternative, the course team held weekly "fishbowl" sessions, where a few facilitators and a few participants conducted an hour long video conference, discussing the weeks' tasks and the participants' projects. Other participants could watch the conference live and interact via twitter or view a recording later.

The context of the OU course was, in many ways, half-way between the small-scale blended format of the University of Haifa and the large-scale on-line format of the MOOC. The number of student was 3-4 times larger than the Haifa course, but the ratio of students to facilitator was better. The time span was much shorter, but students were expected to dedicate more hours a week. The course was conducted completely online, but with a rich set of supporting technologies. Consequently, the studio format was maintained, albeit mediated by forums and the OpenDesignStudio rather than face to face. The shorter time span and the geographical distribution of students made real-world user testing unfeasible. Instead, students were guided in conducting a heuristic evaluation of peer projects.

5 Results

5.1 University of Haifa

The University of Haifa courses have been evaluated in detail in [21]. We recount the main findings here.

All 39 students completed the courses successfully, and responses to the end of course survey suggest they valued its contribution to their understanding of the core issues presented, as well as the pragmatic considerations of implementing these ideas in realistic educational contexts. Students expressed notable criticism about the courses' administrative aspects, as well as the workload which exceeded their expectations. Despite these shortcomings, students all acknowledged the effectiveness of the design studio approach, some noting that it has changed their attitude to the course subjects, and to technology enhanced education in general. Content analysis of the mobile learning course students' design narratives and learning journals uncovers several themes:

- Students initially found the design-inquiry approach confusing, and engaged with it at a superficial level. However, in retrospect students acknowledged the advantages of the design-inquiry approach. To an extent, the initial confusion was alleviated by the iterative dynamics of the design-inquiry process.
- Students reported on their difficulty in concretisation of theories and abstract ideas. The fact that students reflect on this issue indicates that they are aware of it, and indeed – some of their comments suggest the process helped them take steps to address it.
- The design inquiry process at the centre of this course was supported by a variety of tools, methods and representations: a project site template, a design scenario template, force maps, design principles, storyboards, etc. Indeed, students acknowledged the value of these tools.

- Classroom sessions focused on guided group work, and groups' presentation of their progress to the course assembly. Students commented on the contribution of these interactions to their learning.

The ultimate test of a learning intervention is in its sustained effects on learners – their knowledge, attitudes and practices. Paradoxically, university courses are typically evaluated shortly after their completion, thus measuring only their short-term effects. In an attempt to counter this observation, we surveyed the students at the University of Haifa courses two years after the course completion. Using the email addresses students had used at the time of the course, we circulated a short web-based survey. This survey consisted of 9 likert-type questions, and one open comment. The questions aimed to assess students' perception of the course's contribution to their theoretical knowledge and their professional practices. 16 out of the 38 eligible students (excluding the author of this paper) responded to the survey. Fig. 4 shows a summary of the responses. These suggest that even with the advantage of hindsight, students acknowledge both the theoretical and the practical contribution of the course.

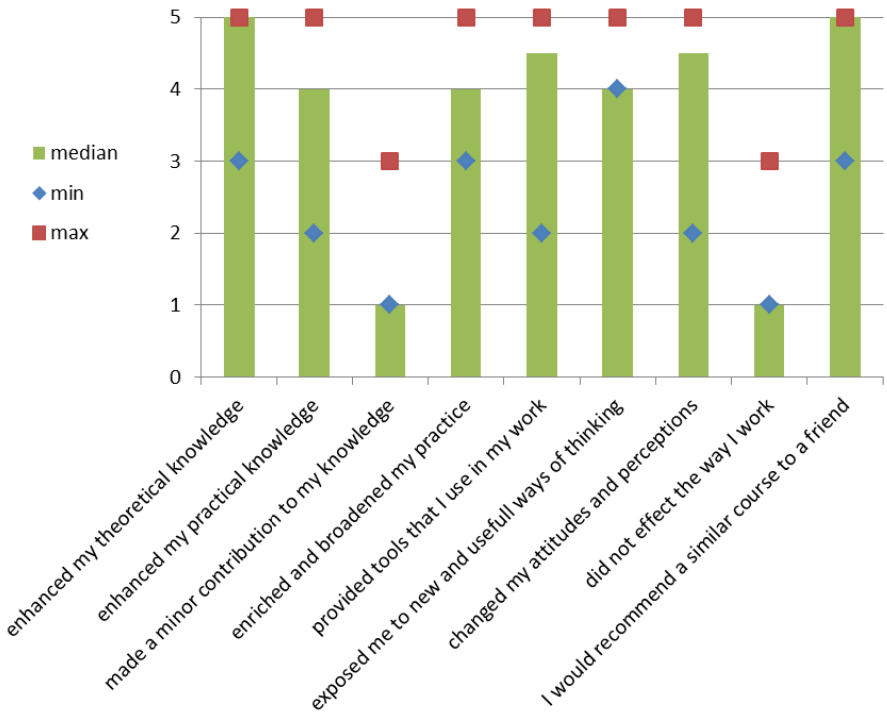

Fig. 4. Results University of Haifa long-term effects survey

5.2 OLDS MOOC

Overall, the OLDS MOOC was fairly successful in achieving its aims. It raised awareness to the field of learning design, and exposed a broad audience to a variety of

tools, techniques, and methodologies. The MOOC resources are open and freely available, and are frequently used: the last week saw approximately 700 visitors on the MOOC site. We have anecdotal evidence from participants testifying that the MOOC has changed their professional perceptions and practices.

Nevertheless, as [6] notes: "Collaborative group working as implemented in this course design did not achieve the desired result. Consequently, whilst a good number of participants attempted to, or indeed, formed, nascent course development or study support groups these in general did not last more than a few weeks. Participants did however value the sharing, commenting and feedback that too place in broader course space and the sense of community this engendered"

Likewise, we are aware of only a very small number of projects (group or individual) which succeeded in following the full design inquiry of learning cycle. However, the evidence suggests that many participants did appreciate the DIL approach, and adopted elements of it, such as investigating the context of design, reviewing examples of past innovation and projecting the lessons from these to their project, ideation, prototyping and evaluation.

Taken together, the evidence suggests that the individual activities were successful, and learners found the community experience rewarding, but the Learning Design Studio approach failed. This can, to an extent, be explained by shortcomings of the supporting technology. However, even if the technical issues would have been resolved, it is questionable how many participants would have chosen to, or would have the capacity to, dedicate the sustained effort required to complete a project. It appears that the LDS format relies on strong group cohesion and intensive tutor support – both of which are hard to achieve in a MOOC setting.

5.3 OU

As noted above, the OU course LDS has only recently completed its first presentation, and it is currently being evaluated. Nevertheless, initial analysis indicates that by and large this was a success. Ten projects have completed a full cycle of investigating the project context, reviewing past cases and relevant theories, applying the lessons from these to the design and development of a prototype, and conducting a structured evaluation of the prototype.

Student reflections suggest that most of them found the LDS block challenging but rewarding, and believe they will make use of the knowledge they acquired.

However, students reported numerous technical difficulties, and noted that the extensive workload prevented them from reflecting on the process. In order to support the students in a distance learning environment, we attempted to provide very detailed instructions and scaffold activities by templates designed for the various tasks. Many students found these too prescriptive and felt that at times the tasks were reduced to form filling exercises.

Most of these issues would appear to be fairly superficial, and can be resolved by refining the guidance materials and supporting technologies. Overall, this experiment seems to suggest that the LDS format is not limited to traditional, small class, face to face scenarios – but can also be applied effectively in a large scale distance education setting.

6 Discussion

The three cases presented above suggest that the DIL approach offers significant value for educational practice, and a robust framework for training and development of educational professionals. Specifically, the manifestation of this approach in the LDS emerges as an effective format for courses in TEL. However, this format has its limitations, and may not be suitable for certain circumstances.

DIL combines an inquiry-based pedagogy with a design-based epistemology. The inquiry learning model posits that learning is more effective when grounded in active exploration of questions which are meaningful to the learners. In the cases presented here, the learners are educational professionals wishing to make effective use of technology in their practice. Thus, their inquiry explored questions pertaining to this domain. Design, in these cases, was adopted both as a mode of learning and as a mode of action: students learned *by* design, and they learned *to* design. The evaluation of the projects in the University of Haifa courses [14] showed that students had assimilated both relevant case studies and techno-pedagogical theories, by binding them to a personally meaningful context of action.

The LDS model adds the constuctionist, project-based, collaborative pedagogical features of the studio-based educational tradition of design practices. The initial feedback from the OU course suggests that students experienced a sense of satisfaction in completing a meaningful project – such a sense is arguable significant in terms of the affective dimension of learning. Students in all three cases reported that they valued the social interaction and in the two university course cases – the positive impact of the project group on their learning experience. This is particularly notable in the case of distance learning, as the OU internal surveys persistently show students aversion to collaborative learning. In both the University of Haifa and the OU cases, students were highly active in social learning interactions within and between groups. The feedbacks between groups and sharing the opinions in class and online discussions helped the students in constructing new meanings and juxtaposition different points of view.

Educational practice, and consequently – educational technology – is always context-dependent. The LDS approach places an emphasis on documenting and articulating the context in which the pedagogical challenge is situated, and carefully referring to that context in the design of the solution. As discussed in [20] – this challenge of getting students to analyse context is far from resolved, but the courses showed promising signs in this respect. Several participant comments from both the MOOC and the OU course stress this particular aspect.

As our experience suggests, and the student feedback confirms, the LDS model is a demanding one, both for students and for tutors. Its success is likely to be limited without serious commitment of both. For this reason, it is probably less suitable for more "casual" learning situations, such as MOOCs. However, where the commitment is present – it is highly rewarded.

7 Conclusions

We opened this paper, perhaps somewhat provocatively, with Ben Goldacre's call for turning education into an "evidence based profession". We argued that this is a

laudable cause, but its fault lies in its implicit model of evidence, or scientific process. We presented design science as an alternative paradigm, which we claim is more suitable for educational research, and offered Design Inquiry of Learning (DIL) as a projection of that paradigm into the domain professional practice.

The main bulk of this paper reviewed the Learning Design Studio (LDS) format, as a pedagogical structure for training educational professionals in DIL. We presented its theoretical underpinnings, its fundamental principles, and a proposed sequence of learning activities. We then reviewed three recent implementations of this model.

The preliminary evidence from these three cases seems to indicate that the model has merit, and appears to deliver on its promises. Students have achieved impressive results in the course of their project work. They report that the courses have enriched them both theoretically and in terms of practical skills. Perhaps even more important, the courses manage to link the two together, and promote a critical, informed, systematic and context-sensitive mode of practice.

Technology Enhanced Learning has established itself as a significant field of scientific inquiry. Yet this field often finds it challenging to disseminate its knowledge beyond the academic circle. A DIL approach and the LDS model in particular, may offer a possible way of breaching the divide between research and practice in education.

As the OLDS MOOC example illustrates, while the DIL approach has a wide remit – the LDS model imposes considerable requirements on the learning situation, and thus may not be suitable in certain conditions.

Finally a caveat is due. The cases reported here are still but a small sample, and their accomplishments and shortcomings may be partially attributed to personal style, extraneous factors, or a simple Hawthorne effect. Nevertheless, the evidence is strong enough to warrant further independent trials of the models presented here and their implementation modes.

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